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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/607,922	06/30/2000	William Frederick Bosch	015290-426	9687

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BURNS DOANE SWECKER & MATHIS L L P
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EXAMINER

UMEZ ERONINI, LYNETTE T

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 06/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/607,922

Applicant(s)

BOSCH, WILLIAM FREDERICK

Examiner

Lynette T. Umez-Eronini

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-34 and 36 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☐ Claim(s) 1-34 and 36 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 6-14, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schoepp (WO (99/50886) in view of Huang et al. (US 6,267,121 B1).

Schoepp teaches a method of plasma conditioning a sintered surface of a ceramic part of a semiconductor processing chamber, the part being made of a ceramic material, the method comprising treating a sintered SiC surface and reducing particle contamination by supplying process gas to the processing chamber (page 2, lines 13-15 and page 3, line 8-9) and energizing the process gas into a plasma that comprises high density plasma (page 2, line 28 - page 3, line 8) with a chamber pressure below 300mTorr, antenna power at 200-5000 watts, and process gas that includes CHF₃, C₂HF₅ and or C₂F₆ (page 10, lines 11-15). The aforementioned further reads on,

A method of processing semiconductor substrates and reducing particle contamination during processing of the substrates, the method comprising steps of:

(a) installing at least one ceramic part made of a non-oxide material and having a machined and/or sintered surface in an interior space of a vacuum processing chamber so that the surface is exposed to the interior space;

(b) after (a), treating the exposed surface to reduce particles of the non-oxide ceramic material attached to the exposed surface by a high intensity plasma conditioning treatment.

Schoepp further teaches, "(c) removing the substrate from the processing chamber;" (claim 1).

Schoepp differs in failing to teach (c) after step (b), processing at least one production wafer by supplying process gas to the processing chamber, **in claim 1**; and (ii) before processing production wafers in the processing chamber with the part installed in the processing chamber, the conditioning treatment comprising treating the exposed surface with a high density plasma while seasoning the processing chamber, **in claim 14**.

Huang teaches, "Thus, it becomes necessary to periodically clean the inside walls of the chamber. This is typically done using some sort of cleaning process. Once the walls have been cleaned the chamber may be used again for the reactive ion etching of many more wafers. However, it turns out that the electrical characteristic of the chamber are altered by this cleaning process and do not return to normal until the unit has been run in etch mode for a certain amount of time. To avoid wasting product wafers it is standard practice to 'season' a freshly cleaned chamber using blank wafers" (column 1, lines 24-33). "The present invention teaches a method that uses only one wafer for achieving the same results previously obtained with 12 wafers" (column 2, lines 10-12). "To head of the possibility of the walls becoming too heavily coated, the interior walls are thoroughly cleaned on a routine schedule as a form of preventive

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maintenance" (column 3, lines 25-27). "Once dry cleaning has been satisfactorily completed it becomes necessary to 'season' the unit" (column 3, lines 33-34). The seasoning process as described above (i.e. with RF power applied to both the wafer and the walls) . . . being preferred" (column 3, lines 62-65). Huang described in the above, "RF power . . . is now applied to the wafer. . . . This causes electrical excitation of the gas, thereby forming a high-density low frequency plasma (column 3, lines 50-54). Hence, the said aforementioned reads on,

After step (b), processing at least one production wafer by supplying process gas to the processing chamber as in claim 1 and step (ii) in the present claim 14.

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Schoepp by using Huang's method of seasoning the materials inside and the interior of a wafer chamber then performing a reactive ion etching for the purpose of restoring the electrical characteristics of the chamber that are altered by cleaning (seasoning).

3. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schoepp (WO 99/50886) in view of Huang (US '121 B1) as applied to claim 1 above, and further in view of Wicker (US 5,863,376).

Schoepp in view of Huang differs in failing to teach sequential treatment of no more than 50 wafers in the processing chamber, **in claim 5**.

Wicker teaches a sequential method of processing of 25 wafers in the chamber (column 5, lines 5 and 6), which encompasses a method of sequential treatment of no more than 50 wafers in the processing chamber, as claimed in the present invention.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Schoepp in view of Huang by sequentially treating no more than 50 wafers in the processing chamber as taught by Wicker for the purpose of minimizing the degradation of the quality of the processed substrate during sequential batch processing of substrates (Wicker, Abstract).

4. Claims 15-28, 30, 33, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schoepp (WO 99/50886).

Schoepp teaches a method of plasma conditioning a sintered surface of a ceramic part of a semiconductor processing chamber, the part being made of a ceramic material, the method comprising treating a sintered SiC surface and reducing particle contamination by supplying process gas to the processing chamber (page 2, lines 13-15 and page 3, line 8-9) and energizing the process gas into a plasma that comprises high density plasma (page 2, line 28 - page 3, line 8) with a chamber pressure below 300mTorr, antenna power at 200-5000 watts, and process gas that includes CHF_3 , C_2HF_5 and or C_2F_6 (page 10, lines 11-15). The aforementioned further reads on, the surface of the ceramic part has been machined and sintered prior to treating the surface with a high intensity plasma as in claims 33 and 34.

Schoepp differs in failing to teach contacting the surface with a high intensity plasma before processing production wafers in the processing chamber with the ceramic part being present in the processing chamber, **in claim 15**.

It is well known in the art to season a process chamber and the materials in the chamber by operating the chamber under the same conditions as those during processing a wafer so as to prepare the chamber and materials for use.

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Schoepp by contacting the surface with a high intensity plasma before processing production wafers in the processing chamber with the ceramic part being present in the processing chamber for the purpose of conditioning the chamber prior to processing a wafer for the purpose of to prepare the chamber and materials for use.

5. Claims 29 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schoepp (WO '886) as applied to claim 15 above, and further in view of Huang et al. (US 6,267,172 B1).

Schoepp differs in failing to teach plasma conditioning comprising treating the machined and/or sintered surface with a high-density plasma generated while seasoning the reactor and Schoepp differs in failing to teach b) after a) and before processing production wafers in the plasma reactor with the ceramic part installed in the plasma reactor, respectively in claims 29 and 36.

Huang teaches seasoning a high density plasma etching chamber by supplying a mixture of chlorine, oxygen, helium and radio frequency power to wafer and radio frequency bias power to chamber walls to excite the gas mixture (Table 1 and claim 10).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Schoepp by plasma treating a high density chamber as taught by Huang regardless of whether the chamber comprises a non-oxide, sintered and/or machined ceramic part for the purpose of cutting down the number of processing steps involved in restoring the electrical characteristics of processing chamber after it has undergone cleaning process (column 1, lines 24-33).

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

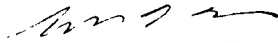
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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703-308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703-972-9310 for regular communications and 703-972-9311 for After Final communications.

ltue
June 16, 2003.


BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700